

Characterising the *suffulta* mutation in tomato

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Background

Plastids play vital roles in the growth and development of plant cell, from photosynthesis to synthesis of amino acids, hormones and fatty acids, as well as nitrogen assimilation. The *suffulta* mutant of tomato has significant plastid phenotype with giant chloroplasts resulted from abnormal plastid division in leaf mesophyll cells. There have been some evidences suggesting that the *SUFFULTA* gene could be homologous to *ARC6* from *Arabidopsis*, which functions in plastid division. Previous work has been done in mapping *SUFFULTA* gene and monitoring the expression of the gene's product.

Materials and methods

The main aim of this project is to transform the tomato *suffulta* mutant with *ARC6* gene from *Arabidopsis* to investigate if *SUFFULTA* is indeed the homolog of *ARC6* in tomato. The complementary transformation is done in the seedlings of *suffulta* mutants of three alleles, namely *su-1*, *-2* and *-3*, using *Agrobacterium* mediated method and MicroTom procedure. *ARC6* gene is cloned from genomic DNA of *Arabidopsis* together with its promoter to be used in the binary vector for transformation.

Outcomes

As the nature of *suffulta* mutant is largely unknown, the present study can help to characterise the candidate gene for this mutation and thus can shed some light into the molecular mechanism of plastid division in tomato.

REFERENCES

- Glynn JM, Froehlich JE and Osteryoung KW (2008). *Aarabidopsis* ARC6 coordinates the division machineries of the inner and outer chloroplast membranes through interaction with PDV2 in the intermembrane space. *Plant Cell* **20**, 2460-2470
- Nakagawa T, Kurose T, Hino T, Tanaka K, Kawamukai M, Niwa Y, Toyooka K, Matsuoka K, Jinbo T, and Kimura T (2007). Development of series of gateway binary vectors, pGWBs, for realizing efficient construction of fusion genes for plant transformation. *Journal Of Bioscience And Bioengineering* **104**, 34-41
- Pyke K and Forth D (2006). The *suffulta* mutation in tomato reveals a novel method of plastid replication during fruit ripening. *Journal of Experimental Botany* **57**, 1971-1979

- Pyke KA, Rutherford SM, Robertson EJ and Leech RM (1994). *arc6*, a fertile *Arabidopsis* mutant with only two mesophyll cell chloroplasts. *Plant Physiology* **106**, 1169–1177.
- Pyke KA (1997). The genetic control of plastid division in higher plants. *American Journal of Botany* **84**, 1017–1027.
- Pyke KA and Leech RM (1994). A genetic analysis of chloroplast division and expansion in *Arabidopsis thaliana*. *Plant Physiology* **104**, 201–207.
- Parase S (2008). Characterise the candidate gene for the *suffulta* mutation in tomato. Msc PGM project
- Robertson EJ, Pyke KA and Leech RM (1995). *Arc6*, an extreme chloroplast division mutant of *Arabidopsis* also alters proplastid proliferation and morphology in shoot and root apices. *Journal of Cell Science* **108**, 2937–2944.
- Vitha S, Froehlich JE, Koksharova O, Pyke KA, Erp HV and Osteryoung KW (2003). ARC6 is a j-domain plastid division protein and an evolutionary descendant of the cyanobacterial cell division protein Ftn2. *Plant Cell* **15**, 1918–1933
- Yang W, Glynn JM, Olson BJSC, Schmitz AJ and Osteryoung KW (2008). Plastid division: across time and space. *Current Opinion In Plant Biology* **11**, 577 -584